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Chapter 5 NUMBER SYSTEMS

1) A structured program is written in
(a) Gates (b) Modules (c) OR gate (d) Flow Chart

2) Which type of programs are difficult to debugs?
(a) Structured (b) Unstructured (c) OS (d) Application

3) The DEF statement in BASIC can be used to define a name of a
(a) built in library function (b) Single line statement function
(c) Subroutine (d)All

4) In structured or modular programming a large program is divided into smaller, manageable parts called
(a) Sub- programs (b) Modules (c) Files (d) Both a & b

5) How many types of subprograms in BASIC?
(a) 2 (b) 3 (c) 4 (d) None

6) In the function ABS (-2.2) becomes
(a) 2.2 (b) -2.2 (c) 2 (d) None

7) General format of the function LEFT $
(a) LEFT $ (A, &, n) (b) LEFT$(A$)
(c) LEFT $($, n) (d)LEFT$(A$,n)

8) A function is used to calculate and return
(a) 4 values (b) 3 values (c) 2 values (d) 1 value

9) To extract any portion of a string in BASIC one would be
(a) MID $ (b) RIGHT$ (c) LEFT$ (d) STRING$

10) A piece of data on which the function has to operate is called
(a) Data file (b) Input data (c) Argument (d) Return value

11) Built in functions are also known as
(a) Standard (b) Library (c) Intrinsic (d) All

12) Instructions that are written once in the main program or independently and can be called more than one time in the main program is called
(a) Control statement (b) Loop (c) Subprogram (d) None

13) Output of CHR$(65)
(a) A (b) B (c) C (d) D

14) Which of the following functions are written by the language developers?
(a) User defined (b) Library (c) Both a & b (d) None

15) BASIC library functions are divided into
(a) 4 types (b) 3 types (c) 2 types (d) 1 types

16) Which BASIC function is used for generating numbers which are used in simulation problems?
(a) INT (b) RND (c) ABS (d) SGN

17) Which of the following BASIC function returns the absolute value of given number or expression?
(a) FIX (b) SQR (c) ABS (d) ABC

18) Which of the following BASIC function returns the integral part of real number or expression. It drops the decimal point and number to the right of it?
(a) FIX (b) SQR (c) ABS (d) TAB

19) Which of the following BASIC function returns the square root of any positive no.?
(a) FIX (b) INT (c) SQR (d) ABS

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20) Output of the print VAL ("240- F Johar Town")
(a) F (b) 240 (c) 240- F Johar Town (d) None

21) A file is activate with one of the following statement before its use
(a) WRITE (b) READ (c) PRINT (d) None

22) Which function skips x spaces in a print statement?
(a) INT (b) FIX (c) SPC (d) RND

23) The solution to simplify the long and complex program is?
(a) GOTO (b) Spaghetti code (c) Sub program (d) IF...THEN

24) Module is a
(a) Internal directory (b) Complex program
(c) Complete a single value (d) Small part

25) Library functions in BASIC are
(a) Generally supplied by the computer manufacturer
(b) Developed by the programmer
(c) Supplied as part of the BASIC system
(d) In built in every computer system

26) When RETURN is encountered in a BASIC subroutine, the program returns to the statement?
(a) Immediately following GOSUB (b) Immediately preceding GOSUB
(c) at the beginning of the subroutine (d) at the beginning of the main program

27) Which of the following BASIC statement is used to define your own function?
(a) DEF FN (b) USER FN (c) DEF (d) FN

28) The output of a function INT (-5.7) is
(a) -5 (b) -4 (c) -6 (d) 5

29) Which of the following BASIC function is used to print or insert the blank spaces?
(a) LEFT $ (b) RIGHT $ (c) STR $ (d) SPACE $

30) Which of the following functions is used to return the trigonometric ratio called sin of angle x?
(a) ANGLE ( ) (b) SINE ( ) (c) COS ( ) (d) SIN ( )

31) PRINT SQR (4) would be
(a) 4 (b) -2 (c) 2 (d) 16

32) LEFT $ ("KIPS", 3) =
(a) IPS (b) kip (c) KI (d) KIP

33) Which of the following statement must be placed at the end of the main program?
(a) END (b) STOP (c) RETURN (d) CLOSE

34) Which of the following consists of alphabets, digits and special characters?
(a) Record (b) Field (c) Character (d) File

35) Which of the following is a group of related characters to have a unit of information?
(a) Record (b) Data Fields (c) Character (d) File

36) Which of the following is a collection of fields to provide information about an entity in a file?
(a) Record (b) Field (c) Character (d) File

37) Types of files in BASIC program
(a) 5 (b) 4 (c) 3 (d) 2

38) OPEN statement
(a) Prepare a file for processing (b) Print the file
(c) Copy the file (d) Delete the file

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39) CHR$ can get the ASCII
(a) 255 values (b) 250 values (c) 256 values (d) 254 values

40) Types of file access methods in BASIC
(a) 2 (b) 3 (c) 4 (d) 5

41) The extension of program file is
(a) .DAT (b) .EXE (c) .BAS (d) .COM

42) The extension of data file is
(a) .DAT (b) .EXE (c) .BAS (d) .COM

43) Which of the following statement is used to print values of a file in file handling?
(a) INPUT (b) READ (c) OPEN (d) WRITE

44) To read information from a file, it must be opened for
(a) Input Mode (b) Output Mode (c) Append Mode (d) Both a & b

45) Which of the following is a reserved section of primary storage used for storing temporary data being written to or read from a file?
(a) Register (b) Buffer (c) Both a & b (d) None

46) In BASIC you can use a file in
(a) 5 Modes (b) 4 Modes (c) 3 Modes (d) 2 Modes

47) Which of the following mode means that the data will be added to the end of an existing file on disk?
(a) INPUT (b) OUTPUT (c) APPEND (d) All

48) Which of the following mode means that the program will eventually write data to the file?
(a) INPUT (b) OUTPUT (c) APPEND (d) All

49) Which of the following BASIC statement disconnects the connection between the data file and the BASIC program?
(a) CLOSE (b) CREATE (c) OPEN (d) WRITE

50) A file is activated with one of the following statement before its use
(a) WRITE (b) READ (c) PRINT (d) None

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ANSWER KEY

1	B	11	D	21	D	31	C	41	C
2	B	12	C	22	C	32	D	42	A
3	B	13	A	23	C	33	A	43	D
4	D	14	B	24	D	34	D	44	B
5	A	15	C	25	B	35	A	45	B
6	A	16	B	26	B	36	A	46	C
7	D	17	C	27	A	37	D	47	C
8	D	18	A	28	A	38	A	48	B
9	A	19	C	29	D	39	C	49	A
10	C	20	B	30	D	40	A	50	D

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SHORT QUESTIONS

Q1: What is subprogram or module?

SUBPROGRAM OR MODULE

In structured programming, a large program is divided into smaller, manageable parts called sub-program or modules. A sub-program is designed to perform a specific task. A module can be further divided into smaller modules.

Q2: What is a Function?

FUNCTION

A function is a set of instructions that performs a particular task. A functions is also called a subprogram.

Q3: What is arguments or parameters?

ARGUMENTS OR PARAMETERS

Information which is passed to a function is called an Arguments and an arguments is also called a parameters.

Q4: What are the advantages of writing Subprogram or Function?

ADVATAGES OF SUBPROGRAM

The advantages of writing a subprogram are given below.

(1) Subprogram can be called anywhere in the program.
(2) By using functions we can debug a large program very easily.
(3) By using functions we can reduce the size of a program.

Q5: What do you know about structured programming?

STRUCTURED PROGRAMMING

The style of programming in which a program is written in modules or blocks and allows only one entrance to each module and only one exit from each module it is called structured programming.

Q6: What is unstructured programming?

UNSTRUCTURED PROGRAMMING

Unstructured program allows multiple entrance to each module and multiple exit from each module. Unstructured programs are difficult to correct and maintain.

Q7: What are systems defined functions?

SYSTEM DEFINED FUNCTIONS

The functions which are developed by developers of BASIC language and are provided with BASIC language are called Library or Built in functions. These functions make the programming simpler and also save the time of programmer to design the program. These functions are also known as standard functions, library functions or intrinsic functions.

Q8: What is the purpose of system defined function?

PURPOSE OF SYSTEM DEFINE FUNCTION

System defined functions make the program easier. Basically, these are programs which have been written by developers and have been incorporated in the system.

Q9: What are Numeric functions?

NUMERIC FUNCTION

The numeric functions are applicable on numeric values only and return the numeric values as output result. In BASIC, there are too many numeric functions available but the most important numeric functions are ABS, INT, SQR etc.

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Q10: What do you know about string functions?

STRING FUNCTION

The string functions are used to process character strings and return the numeric values or strings. The most commonly used string functions are LEFT$, Right$, CHR$ etc.

Q11: What is the purpose of system defined function?

SYSTEM DEFINED FUNCTION

System defined functions make the program easier. Basically, these are programs which have been written by developers and have been incorporated in the system.

Q12: What is the user defined function?

USER DEFINED FUNCTION

The functions which are developed by the used of BASIC language to solve the problem are called user define function. User defined function also returns a single value. In BASIC, user define functions are also referred to as procedures.

Q13: What are the properties of user defined function?

PROPERTIES OF USER DEFINED FUNCTION

1. It may be numeric or string function.
2. DEF FN statement is used to make a user defined function.
3. Variables used in function definition do not disturb program variables.
4. To use a function, exact name along with the arguments are given.
5. A function can be used in the expression of a program as a variable.
6. If a function is called before it has been defined, an error message will be appeared.

Q14: What is the purpose of DEF FN statement?

PURPOSE OF DEF FN STATEMENT

In BASIC, the DEF FN statement is used to define a user-defined function. Once a program is defined by the user, it may be used anywhere in the program in the same way as built in functions are used.

The general format of DEF FN statement is

DEF FNname (arguments) = expression

Q15: Convert into $16 + X^2$? By using user define function.

```
10 CLS
20 DEF FNS ( X ) = SQR ( 16 + X ^ 2 )
30 PRINT FNS ( 5 )
40 END
```

Q16: HOW is DEF statement different from GOTO statement?

DIFFERENCE BETWEEN DEF & GOTO STATEMENT

DEF Statement	GOTO Statement
1. DEF statement is used to define a function.	1. GOTO statement shifts the control to GOTO specific line no.
2. DEF statement has a user define function name.	2. GOTO statement does not have a name it has a line no.
3. Syntax: DEF FNname (arguments) = expression	3. Syntax: Line No GOTO line No

Q17: Write a program that changes temperature in Celsius to Fahrenheit. Use DEF FN statement

```
10 CLS
20 DEF FNP ( c ) = 9 / 5 * C + 32
30 PRINT FNP ( 5 )
40 END
```

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Q18: What is a subroutine?

A subroutine subprogram is a series of BASIC statements which are written once into a program as but these may be used a number of times anywhere in a BASIC programs as and when desired.

Q19: What are the properties of subroutines?

PROPERTIES OF SUBROUTINE

1. It can be called anywhere in a program.
2. To call the subroutine GOSUB statement is used.
3. Every subroutine should have the facility to returning control back to next of its calling statement. For this purpose RETURN statement is used.

Q20: Describe the use of GOSUB & Return statement?

USE OF GOSUB & RETURN STATEMENT

GOSUB statement is used to invoke a subroutine. RETURN statements show a formal end of the subroutine and transfers control back to the line following the GOSUB statement.

Q21: What is the purpose of GOSUB/RETURN statement?

PURPOSE OF GOSUB RETURN STATEMENT

Two statements GOSUB and RETURN are used in BASIC language for a subroutine. GOSUB statement is used to invoke a subroutine. RETURN statements show a formal end of the subroutine and transfers control back to the line following the GOSUB statement.

Q22: What are the advantages of writing subroutines?

ADVANTAGES OF WRITING SUBROUTINES

The advantages of writing a subprogram are given below.

1. Some subprogram can be called anywhere in the program without rewriting it again and again.
2. Debugging of a program containing subprograms is faster than a program doing the same job without subprograms.
3. Documentation of a program having subprograms is simpler than the program without subprograms.
4. Proper use of subprograms back up a big program into small logical parts which makes understanding and modification of the program quite easy.

Q23: What is the different between GOTO & GOSUB/RETURN Statement?

DIFFERENCE BETWEEN GOTO & GOSUB

GOTO	GOSUB/RETURN
1. GOTO statement transfer the control to the specified line number.	1. GOSUB/RETURN statement is used to invoke a subroutine by its line number
2. A GOTO statement is used for unconditional transfer of control from one part of the program to another.	2. GOSUB statement is used to transfer the control to a subroutine.
3. When a control is transferred by using GOTO statement, it does not come back.	3. When a control is transferred by using GOSUB statement, the control is transferred back to the statement immediate after GOSUB by using RETURN statement.

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Q24: Write a main routine that used subroutines 200 and 400 to print a block letter E?

```
10 CLS
20 GOSUB 200
30 GOSUB 400
40 GOSUB 200
50 GOSUB 400
60 GOSUB 200
70 END
200 PRINT " x x x x x "
210 RETURN
400 PRINT " X "
410 PRINT " X "
420 RETURN
```

Q25: What is a file?

FILE

A file is a collection of information stored as record usually on a secondary storage device such as disk.

Q26: What is meant by character?

CHARACTER

Character consist of alphabets, digits and special characters. These are represented inside the computer as a sequence of 1s and 0s.

Q27: What are data fields?

DATA FIELDS

Data fields are group of related characters to have a unit of information. For example a student name, his roll no are two different data fields.

Q28: What are records?

RECORDS

Record is a group of related fields is called record. For example the combination of name, father name, roll no, age , address is a record of a student.

Q29: What are program files?

PROGRAM FILES

Program files contain the program or instructions for the computer.

Q30: What are data file?

DATA FILE

Data files contain data and information needed for programs to perform execution successfully. Data files are linked with program file during run-time or compile time.

Q31: What is meant by buffer?

BUFFER

A buffer is a reserved section of primary storage used for storing temporary data being written to or read from a file.

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LONG QUESTIONS

Q1: Briefly describe the opening modes in BASIC.

Opening Modes:

In BASIC, the opening modes are describe below

INPUT	Specifies reading mode. In this mode, data can only be read from the file and no data can be written into it. This mode can be used if the file already exists on the disk. For example, to open a data file " temp. dat " in INPUT mode, the statement is written as OPEN " temp. dat " FOR INPUT AS #1
OUTPUT	Specifies writing mode. In this mode, data can be written into the file. If the data file with the same name already exists on the disk in the same directory it will overwritten. If it does not exit, it will be new created. For example, to open a data file " Record. dat " in OUTPUT mode, the statement is written as OPEN " Record. dat " FOR OUTPUT AS #2
APPEND	Specifies append mode. It is used to open data file for output to append data at the end of existing data file. If the data file does not exist on the disk, a new file is created. For example, to open a data file " Employee. dat " in OUTPUT mode, the statement is written as OPEN " Employee. dat " FOR APPEND AS #3

EXERCISE

Q1: Fill in the blanks.

i) Small ii) Single iii) Different iv) Subroutine v) String
vi) DEF FN vii) Return viii) Random Record

Q2: Choose the correct answer.

(i) A (ii) C
(iii) C (iv) D
(v) C (vi) D
(vii) D (viii) D
(ix) C (x) A

Q3: Write T for True and F for False statement.

(i) T (ii) F
(iii) F (iv) F
(v) T (vi) T
(vii) T (viii) T
(ix) F (x) T

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Q4: What the difference between user-defined function and built in functions?

User Defined Function	Built in Function
1 A user-define function is completely defined and customized by the programmer to solve the problem.	1 Built-in functions are programs that have been written by developers of language and have been incorporated in it.
2 User-define function is also referred as procedure.	2 Built in function is also known as standard function or library function.
3 These functions are defines the function with DEF FN statement.	3 These functions are define with three letter name.
4 These functions are only for the life of given program and are not part of BASIC language.	4 These functions are the part of BASIC language.
If a function is called before it has been defined an "Undefined user function " error occur.	It can be called anywhere in the program.

Q5: Differentiate between Sub-routine and Function.

SUB ROUTINE	FUNCTION
1 A subroutine itself is a small program consisting of set of statements which are usually written within a main program.	1 A function is a pre-defined program.
2 A subroutine can be used to calculate and return many values.	2 A function is used to calculate and return a single value.
3 Subroutine has no name.	3 A function must have a three letter name.
4 Subroutine has no further types.	4 There are two types of functions Library and Built in functions.
5 To call the subroutine GOSUB statement is used.	5 To use a function, exact name along with the arguments are given.

Q6: Describe the use of GOSUB..... RETURN statement.

GOSUB ..... RETURN statement

There are two statements in BASIC that allows us to use the subroutines; the GOSUB statement and RETURN statement. The GOSUB statement will cause the transfer of control to the subroutine. When GOSUB statement is encountered, control is transferred to a new line #. The purpose of GOSUB.....RETURN statement is to branch to and return from a subroutine.

The general syntax of GOSUB statement is

GOSUB Ln

Where

Ln represents the first statement line number of subroutine you want to call.

RETURN statement is used in the subroutine. It returns the control back to the statement immediately following the GOSUB statement that has called the subroutine. A subroutine may contain more than one RETURN statement. Usually, RETURN statement is used as last statement of the subroutine.

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EXAMPLE

```
10 CLS
20 GOSUB 100
30 GOSUB 200
40 END
100 Print "I LOVE PAKISTAN"
110 RETURN
200 Print " WELCOME"
210 RETURN
```

Q7: What is the difference between Sequential and Random files?

Sequential Files:

In sequential access data files, records are stored in physical order. These records are accessed in order, one after the other. In other words, read and write operations on sequential files are done in sequential order. Records are read one by one starting from the beginning of data file until the required record is reached or the end of file is reached. For example, to read the record number 15 within a data file, the program must have to read record 1 to 14 in order to reach at record number 15,

In sequential file, a file position pointer is used by a file to "point to" the next record to be processed in the file. When the data file is opened, the file pointer is at the beginning of the data file, i.e. pointing to the first record. After reading the record, file pointer automatically moves to the next record and so on.

Random Files

Random access file is also referred to as direct access file. With random access, the information from any location within the file may be accessed directly. The direct access method allows reading or writing data faster then the sequential access. Typically, direct access can be achieved by specifying the location within the file to be accessed as a parameter to the read or write operation.

Q8: Describe the way of opening, closing, reading and writing to a Opening a File:

OPEN statement is used to open the data file into memory for writing data into it or read data from it.

The general syntax of OPEN statement is

OPEN "data file" FOR mode AS# [buffer]

Where

Data file	Specifies the name of data file to be opened. You can give any extension of data file. Usually file extension for data file is given as DAT.
Mode	Specifies the opening mode. The opening mode may be INPUT, OUTPUT or APPEND
Buffer	Specifies the buffer number of the file. It may be any integer number. A buffer is a reserved area of main memory where data file is opened. The data is written or read to and from the data file with reference of its buffer number.

CLSOE Statement:

The data file opened for input or output must be closed after performing different operation. CLOSE statement is responsible for transferring the data currently in primary memory to secondary memory. This statement disconnects the connection between the data file and the BASIC program.

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The general form of CLOSE statement is

CLSOE # buffer

You can also close many opened files using a single CLOSE statement as follows

CLOSE #1, #2..... #n

If no parameter is given with CLOSE statement then all currently opened data files are closed. In this case CLOSE statement is written as

CLSOE

READING DATA FROM DATA FILE

To read the data from data file, the file must be opened for INPUT. The INPUT# statement is used to read data from file and store into the variables.

The general form of INPUT# statement to read data from data file is

INPUT# buffer, list of variables

Where

Buffer specifies the buffer number assigned to data file from which the data is to be read.

List of variables specifies the list of variables separated by commas where the contents of record data file are to be stored.

It is noted that the INPUT# statement reads data from the data file from the current position of file pointer. After executing the INPUT# statement, the file pointer moves to the next record of the data file.

It must be noted that there is an end of file (EOF) character at the end of every data file. It helps to read all records of data file until end of file character is reached. The EOF ( ) function is used to check the end of file. If end of file is reached, then this function returns True (1) otherwise False (0). The buffer number of the file you want to read is given as argument to EOF ( ) function. The general syntax of the EOF function is

EOF (buffer)

In the EOF function, the argument specifies the buffer number assigned to data file from which the data is to be read.

EXAMPLE:

```
10 CLS
20 OPEN "rec.doc" FOR INPUT AS # 1
30 WHILE NOT EOF ( 1 )
40      INPUT #1, R, NM$
50 PRINT R, NM$
60 WEND
70 CLOSE #1
80 END
```

Writing a File:

The file must be opened for output to store data into it. The print #1 or WRITE #1 statement is used to write data into the data file. The general format of PRINT #1 or WRITE #1 statement to store data into data file is

WRITE # buffer , list of variable

Where

Buffer specifies the buffer number assigned to data file from which the data is to be read.

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List of variables specifies the list of variables separated by commas where the contents of record data file are to be stored.

Q9: What is the difference between data file and program file?

DATA FILE	PROGRAM FILE
1. A data file is a collection of data arranged in a specific order. 2. Any file is a collection of record and each record is a collection of related data items known as fields. 3. Collection of fields make a record and collection of records make a file. Data and information needed for programs to perform execution successfully. Data files are linked with program file during run-time or compile time.	1. Program file contain the program for the computer. 2. A program file contains a number of lines written in high level language. 3. The program form a program file can be accessed by a computer.

Q11: Write a program to get full name of any person and return the number of characters in his first name?

```
10 CLS
20 N = 0
30 INPUT "Enter Your Name"; NAM$
40 FOR X = 1 to LEN ( NAM$ )
50 N = N + 1
60 IF MID$( NAM$, X, 1 ) =" " THEN N = N – 1 GOTO 80
70 NEXT X
80 Print "Length of your first name is"; N
90 END
```

OUTPUT

ENTER YOUR NAME ? RAZA TAHIR
Length of your name is 4

Q12: Write a program that print ASCII characters from 1 to 255.

```
10 CLS
20 For I = 1 t0 255
30 Print I, CHR$( I )
40 Next I
50 END
```

Q13: Write a program that is used for the conversion of temperature from Celsius scale to Fahrenheit scale with the help of DEF FN function.

```
10 CLS
20 DEF FNP ( C ) = 9 / 5 * C + 32
30 Print FNP ( 25 )
40 END
```

Q14: Write a program to calculate and print following formula by using user-defined function. Combination = n! / k! (n – k)

```
10 CLS
20 DEF FNG ( n!, k! ) = n! / k! * ( n! – k! )
30 Print FNP ( 9,4 )
40 END
```

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Q15: Write a program to implement a telephone directory using sequential access files. Your program should by capable of writing the name, telephone number and address of your friends to a sequential file.

```
10 CLS
20 STOP = 0
30 OPEN "Directory.txt" FOR output as # 1
40 WHILE STOP <> 1
50 INPUT "Enter the Name"; NAM$
60 INPUT "Enter the Telephone No"; TEL$
70 INPUT "Enter the Address"; Add$
80 Write #1, NAM$, TEL$, Add$
90 INPUT "Enter 1 for Exit and 0 for New Entry"; STOP
100 WEND
110 END
```

Q16: Write a program that read an array Z having 12 numbers given by user then print the sum and average of all array elements.

```
10 CLS
20 DIM Z ( 12 )
30 FOR I = 1 to 12
40 INPUT Z ( I )
50 Next I
60 FOR I = 1 to 12
70 SUM = SUM + Z ( I )
90 Next I
```

Q17: Find out the errors in the following program segments if any?

The program (a) has errors in line number 20, 30 and 40.

1. In line no 20, loop K starting value should be 1 and ending value should be 10 to fill the array N$.
2. In line no 30, INPUT statement should have N$(K) instead of N$.
3. In line no 40, NEXT statement should have K instead of I

The program (a) has errors in line number 10. And this program has missing declaration of array K. So this program should be the following

```
10 DIM K ( 15 )
20 FOR J = 1 to 15
30 K ( J ) = J
40 Print K ( J )
50 Next J
```

Q18: Write a program to sort the list of 20 names in descending order.

```
10 CLS
20 DIM N$ ( 20 )
30 FOR F = 1 to 20
40 INPUT  "Enter the Name"; N$( F )
50 Next F
60 FOR I = 1 to 19
70 FOR J = 1 to 19
80 IF N$(J)<N$(J+1) THEN SWAP N$(J),N$(J+1)
90 Next J
100 Next I
110 FOR  P = 1 to 20
120 Print N$(P)
130 Next P
140 END
```

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